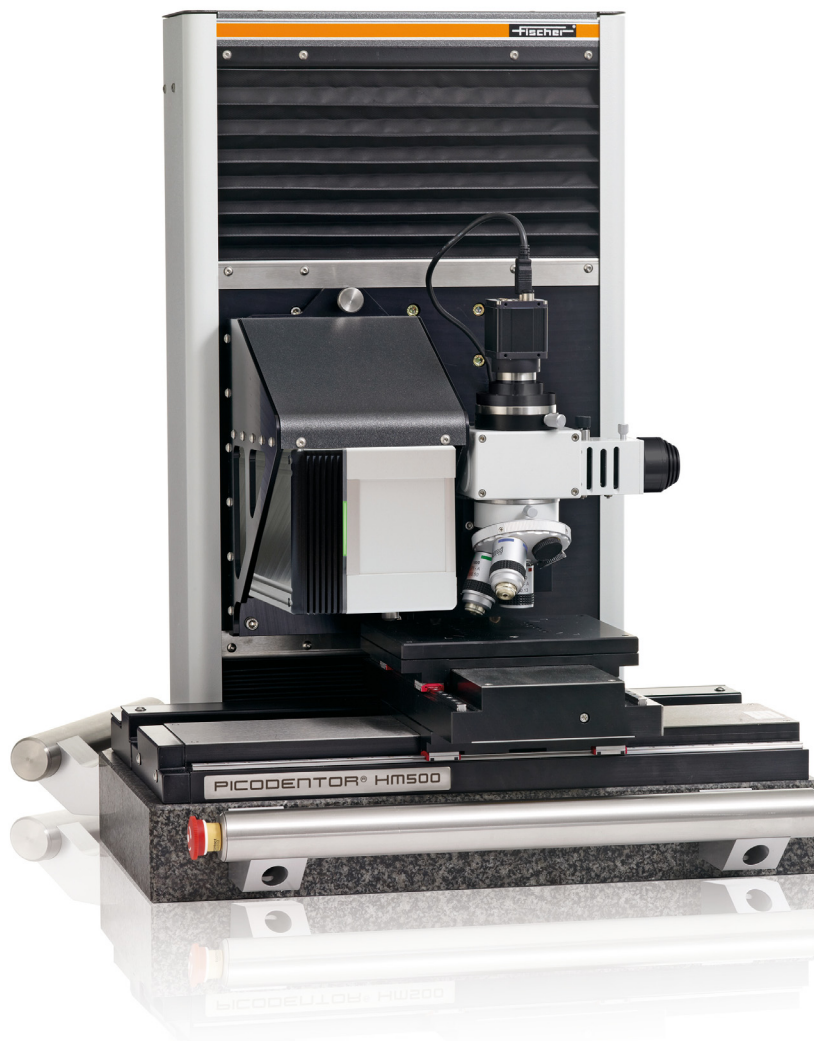


PICODENTOR® HM500 LIGHT

Automated Nanoindentation Measuring System
For Bulk Material and Coatings in the
Nanometer Range



Description

The PICODENTOR® HM500 LIGHT is an automated nanoindentation measuring system and employs the instrumented indentation test method according to ISO 14577 and ASTM E2546. The instrument is perfectly suitable for measurements in development, quality assurance, incoming inspection and process control. It is the LIGHT version of the HM 500 for applications with reduced positioning requirements and fixed configuration.

Typical fields of application

- Hard material coatings and ultra-thin DLC coatings
- Dirt-repellent coatings (e.g., Sol-Gel coatings)
- Super-thin paint coatings
- Ion-implanted surfaces
- Nano-coatings on sensors
- Implants/medical applications
- Matrix effects in alloys
- Biological materials
- Ceramic materials
- Hardness determination on microsections
- Automated measurements on multiple samples
- Coatings on PC hard disks/CDs

Measurable characteristic material quantities

Material characteristics computed according to ISO 14577:

- Martens hardness HM
- Indentation hardness H_{IT} (convertible to HV)
- Percent elastic portion η_{IT} of the indentation work W_{elast}/W_{total}
- Modulus of indentation E_{IT}
- Indentation creep C_{IT}
- ESP – mode, partial load and unload measurements, for depth-dependant determination of quantities like E_{IT} , H_{IT}

Design

Features

- Quick measurements without extensive sample preparation, the HM500 LIGHT requires only 60 seconds for its travel to the measuring position and the zero point determination.
- In-situ zero point determination during the measurement
- User-friendly handling through motor-driven Z-axis
- Microscope with three different magnification settings for accurate positioning on the measurement location
- Natural stone base provides dimensional stability, prevents temperature swings and buffers against vibrations
- Active anti-vibration table for reduction of the impact of vibrations
- Measurement of dark surfaces without sample pretreatment
- Excellent temperature stability of the measuring head means the creep behaviour of materials can be determined precisely with measuring times up to several hours.
- Optional: Dynamic Mode for determining visco-elastic material properties, e.g. of lacquers and polymers

General Specification

| | |
|-----------------|---|
| Intended use | Nanoindentation on lacquer coatings, electroplated coatings, hard material coatings, polymers, metals, glasses and much more |
| Design | Bench top unit with PC, measuring head, positioning device made of natural hard stone, programmable XY-stage, motorized z-axis, joystick for controlling the XY-stage and Z-axis. |
| Damper system | Active anti-vibration table |
| Frame Stiffness | 50×10^6 N/m |

Measuring head

| | | | |
|----------------------------|---|--------------------|-------------|
| Hardness measurement range | 0.001 – 120 000 N/mm ² : near diamond hardness | | |
| Test load range | 0.005 – 500 mN | | |
| Load resolution | ≤ 20 nN | Noise floor | < 100 pm |
| Distance resolution | ≤ 2 pm | Thermal drift rate | < 0.01 nm/s |

Microscope-/ Camera magnification

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|---------------------------------|---|
| Objective | 4x, 20x and 40x |
| Video picture (field of vision) | 1600 µm x 1200 µm, 320 µm x 240 µm, 160 µm x 120 µm |

Indenters

| | | | |
|--------------------------------|---|---------------------------|--------|
| Design | Standard: Vickers, Optional: Berkovich, Knoop, hard metal spheres Ø 0.4 mm or Ø 2.0 mm, special shapes on request | | |
| Approach speed of the indenter | ≤ 0.1 µm/sec | Maximum indentation depth | 300 µm |

Sample Stage

| | |
|-----------------------------|---|
| Design | Programmable XY-stage |
| Sample placement area | 180 x 150 mm (7.1 x 5.9 in) |
| Maximum Travel | 170 x 140 mm (6.7 x 5.5 in) |
| Repeatability precision X/Y | ≤ 2 µm (0.08 mils), direction-independent |
| Max. specimen height | 130 mm (5.1 in) |
| Max. specimen weight | 2 kg |

Options

| | |
|------------------------|---|
| Dynamic Mode | Dynamic Mode for determining visco-elastic material properties, e.g. of lacquers and polymers, Frequency range 0.01 – 50 Hz |
| Acoustic enclosure 850 | For reducing influences of ambient acoustic noise |
| Hardware upgrades | The hardware configuration cannot be changed. |

PICODENTOR® HM500 LIGHT

Electrical data

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|-------------------------------|--|
| Main voltage, mains frequency | 100 to 240 V \pm 10 % 47 – 63 Hz, 360 VA |
| Power consumption | max. 120 W (without evaluation PC) |
| Protection class | IP20 |

Dimensions

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|--|---|
| External dimensions (height x width x depth) | 630 x 650 x 610 mm (24.8 x 25.6 x 24 in) |
| Weight | Measurement system: 120 kg (265 lb) Active anti-vibration table: 40 kg (88 lb) |

Environmental conditions

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|-------------------------------|--|
| Operating temperature | Climatic chamber class 2 10 °C – 40 °C / 50 °F – 104 °F |
| Storage/Transport temperature | 0 °C – 50 °C / 32 °F – 122 °F |
| Admissible air humidity | \leq 95 %, non-condensing |

Evaluation unit

| | |
|------------------|----------|
| Software | WIN-HCU® |
| Operating system | Windows® |

Standards

| | |
|-------------|-------------------------------|
| CE approval | EN 61010 |
| Standards | DIN EN ISO 14577, ASTM E 2546 |

Order

| | |
|-------------------------|---------|
| PICODENTOR® HM500 LIGHT | 605-858 |
|-------------------------|---------|

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